

(1) The cooler structure is fabricated from material of the same thickness and quality as the hull;

(2) The flexible connections are located well above the deepest subdivision draft;

(3) The end of the structure is faired to the hull with a slope no greater than 4 to 1; and

(4) Full penetration welds are employed in the fabrication of the structure and its attachment to the hull.

**§ 119.425 Engine exhaust cooling.**

(a) Except as otherwise provided in this paragraph, all engine exhaust pipes must be water cooled.

(1) Vertical dry exhaust pipes are permissible if installed in compliance with §§ 116.405(c) and 116.970 of this chapter.

(2) Horizontal dry exhaust pipes are permitted only if:

(i) They do not pass through living or berthing spaces;

(ii) They terminate above the deepest load waterline;

(iii) They are so arranged as to prevent entry of cold water from rough or boarding seas;

(iv) They are constructed of corrosion resisting material at the hull penetration; and

(v) They are installed in compliance with §§ 116.405(c) and 116.970 of this chapter.

(b) The exhaust pipe cooling water system must comply with the requirements of this paragraph.

(1) Water for cooling the exhaust pipe must be obtained from the engine cooling water system or a separate engine driven pump.

(2) Water for cooling an exhaust pipe, other than a vertical exhaust, must be injected into the exhaust system as near to the engine manifold as practicable. The water must pass through the entire length of the exhaust pipe.

(3) The part of the exhaust system between the point of cooling water injection and the engine manifold must be water-jacketed or effectively insulated and protected in compliance with §§ 116.400(b) and 116.970 of this chapter.

(4) Each vertical exhaust pipe must be water-jacketed or suitably insulated between the engine manifold and the spark arrester required by § 119.430(g) of this part.

(5) When the exhaust cooling water system is separate from the engine cooling water system, a suitable warning device, visual or audible, must be installed at the operating station to indicate any reduction in normal water flow in the exhaust cooling system.

(6) A suitable hull strainer must be installed in the circulating raw water intake line for the exhaust cooling system.

(c) Engine exhaust cooling systems built in accordance with the requirements of American Boat and Yacht Council (ABYC) P-1, "Installation of Exhaust Systems for Propulsion and Auxiliary Engines," will be considered as meeting the requirements of this section.

**§ 119.430 Engine exhaust pipe installation.**

(a) The design of all exhaust systems must ensure minimum risk of injury to personnel. Protection must be provided in compliance with § 116.970 of this chapter at such locations where persons or equipment might come in contact with an exhaust pipe.

(b) Exhaust gas must not leak from the piping or any connections. The piping must be properly supported by non-combustible hangers or blocks.

(c) The exhaust piping must be so arranged as to prevent backflow of water from reaching engine exhaust ports under normal conditions.

(d) Pipes used for wet exhaust lines must be at least Schedule 80 or corrosion resistant material and adequately protected from mechanical damage.

(e) Where flexibility is necessary, a section of flexible metallic hose may be used. Nonmetallic hose may be used for wet exhaust systems provided it is especially adapted to resist the action of oil, acid, and heat, and has a wall thickness sufficient to prevent collapsing or panting, and is double clamped where practicable.

(f) Where an exhaust pipe passes through a watertight bulkhead, the watertight integrity of the bulkhead must be maintained. Noncombustible packing must be used in bulkhead penetration glands for dry exhaust systems. A wet exhaust pipe may be welded to a steel or equivalent bulkhead in way of a penetration if suitable arrangements

are provided to relieve the stresses resulting from the expansion of the exhaust piping.

(g) A dry exhaust pipe must:

(1) If it passes through a combustible bulkhead or partition, be kept clear of, and suitably insulated or shielded from, combustible material.

(2) Be provided with noncombustible hangers and blocks for support.

(h) An exhaust pipe discharge terminating in a transom must be located as far outboard as practicable so that exhaust gases cannot reenter the vessel.

(i) Arrangements must be made to provide access to allow complete inspection of the exhaust piping throughout its length.

(j) An exhaust installation subject to pressures in excess of 105 kPa (15 psig) or having exhaust pipes passing through living or working spaces must meet the material requirements of part 56 of subchapter F (Marine Engineering) of this chapter.

(k) Engine exhaust installations built in accordance with the requirements of ABYC P-1 will be considered as meeting the requirements of this section.

[CGD 85-080, 61 FR 922, Jan. 10, 1996, as amended at 62 FR 51352, Sept. 30, 1997]

#### § 119.435 Integral fuel tanks.

(a) Diesel fuel tanks may not be built integral with the hull of a vessel unless the hull is made of steel or aluminum.

(b) During the initial inspection for certification of a vessel, integral fuel tanks must withstand a hydrostatic pressure test of 35 kPa (5 psig), or the maximum pressure head to which they may be subjected in service, whichever is greater. A standpipe of 3.5 meters (11.5 feet) in height attached to the tank may be filled with water to accomplish the 35 kPa (5 psig) test.

#### § 119.440 Independent fuel tanks.

(a) *Materials and construction.* Independent fuel tanks must be designed and constructed of materials in compliance with the requirements of this paragraph.

(1) The material used and the minimum thickness allowed must be as indicated in Table 119.440(a)(1), except that other materials which provide equivalent safety may be approved for use under paragraph (a)(3) of this section. Tanks having a capacity of more than 570 liters (150 gallons) must be designed to withstand the maximum head to which they may be subjected in service, but in no case may the thickness be less than that specified in Table 119.440(a)(1).

TABLE 119.440(a)(1)

Material	ASTM Specification (latest edition)	Thickness in millimeters (inches) & [gauge number] <sup>1</sup> vs. tank capacities for:		
		4 to 300 liter (1 to 80 gal) tanks	More than 300 liter (80 gal) and not more than 570 liter (150 gal) tanks	Over 570 liter (150 gal) <sup>2</sup> tanks
Nickel-copper.	B127, hot rolled sheet or plate.	0.94 (0.037) [USSG 20] <sup>3</sup> .....	1.27 (0.050) [USSG 18] .....	2.72 (0.107) [USSG 12]
Copper-nickel <sup>4</sup> .	B122, UNS alloy C71500.	1.14 (0.045) [AWG 17] .....	1.45 (0.057) [AWG 15] .....	3.25 (0.128) [AWG 8]
Copper <sup>4</sup> .....	B152, UNS alloy C11000.	1.45 (0.057) [AWG 15] .....	2.06 (0.081) [AWG 12] .....	4.62 (0.182) [AWG 5]
Copper-silicon <sup>4</sup> .	B97, alloys A, B, and C.	1.29 (0.051) [AWG 16] .....	1.63 (0.064) [AWG 14] .....	3.66 (0.144) [AWG 7]
Steel or iron <sup>5,6</sup> .	.....	1.90 (0.0747) [MSG 14] .....	2.66 (0.1046) [MSG 12] .....	4.55 (0.1793) [MSG 7]
Aluminum <sup>7</sup> ..	B209, alloy 5052, 5083, 5086.	6.35 (0.250) [USSG 3] .....	6.35 (0.250) [USSG 3] .....	6.35 (0.250) [USSG 3]
Fiber reinforced plastic.	.....	as required <sup>8</sup> .....	as required <sup>8</sup> .....	as required <sup>8</sup>

<sup>1</sup>The gauge numbers used in this table may be found in many standard engineering reference books. The letters "USSG" stand for "U.S. Standard Gauge," which was established by the act of March 3, 1892 (15 U.S.C. 206), for sheet and plate iron and steel. The letters "AWG" stand for "American Wire Gauge" (or Brown and Sharpe Gauge) for nonferrous sheet thicknesses. The letters "MSG" stand for "Manufacturers' Standard Gauge" for sheet steel thickness.

<sup>2</sup>Tanks over 1514 liters (400 gallons) shall be designed with a factor of safety of four on the ultimate strength of the material used with a design held of not less than 1220 millimeters (4 feet) of liquid above the top of the tank.

<sup>3</sup>Nickel-copper not less than 0.79 millimeter (0.031 inch) [USSG 22] may be used for tanks up to 114-liter (30-gallon) capacity.